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**Offensive Counterair during Operation Allied  
Force: Operational Shortfalls and Implications**

Christopher L. Shay  
LCDR, United States Navy

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of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily  
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## **Introduction**

The rapid and continuing proliferation of advanced weapons and technology expands the scope and complexity of attaining air superiority and protecting friendly forces and vital interests...The detection capabilities, mobility, and lethality of enemy SAM systems and fighter aircraft have significantly increased.<sup>1</sup>

*Joint Publication 3-01*

Attacking and neutralizing an integrated air defense system by conducting joint offensive counterair operations is critical to achieving and maintaining air dominance.<sup>2</sup> As General Ronald R. Fogelman, Chief of Staff, United States Air Force, stated, “Gaining control of the air- over both friendly and enemy territory- has been one of the constants of warfare in the last half of the 20<sup>th</sup> century and will continue to be so in the future. Simply put, air and space superiority is the key to winning wars with the fewest losses.”<sup>3</sup>

Air dominance enables friendly forces the full flexibility to “conduct parallel warfare across the theater of operations.”<sup>4</sup> Gaining air dominance will remain an operational priority in the future. As Richard Hallion and Michael Irsh noted, “Whereas the concept of and need for air superiority is largely unchanged, how it is achieved is changing. Air superiority has always been a required ‘state’ rather than an optional ‘mission’ because it enables all operations undertaken by the joint force commander. This is reflected in “Joint Vision 2010”.<sup>5</sup>

During Operation ALLIED FORCE, offensive counterair operations conducted by U.S. and NATO forces failed to completely neutralize the Serbian Integrated Air Defense System.<sup>6</sup> Secretary of Defense William S. Cohen and General Henry H. Shelton, Chairman of the Joint Chiefs of Staff, stated, “The threat posed by Serbia’s offensive air capability was eliminated rapidly. Reducing Serbian defensive capabilities did not proceed as quickly, however, because the Serbs possessed a capable integrated air defense system that was very

difficult to eliminate.”<sup>7</sup> Although the Serbian integrated air defense system was capable, it was not the most advanced system available and yet it continued to function and engage U.S. and NATO aircraft throughout the 78-day operation. Our inability to efficiently eliminate Serbia’s relatively less advanced system suggests that we are not presently prepared to neutralize the more advanced and readily available integrated air defense systems.

Through critical analysis of Operation ALLIED FORCE and Joint Task Force NOBLE ANVIL, this paper will discuss three operational shortfalls that impacted offensive counterair operations and how those shortfalls may impact our ability to achieve air dominance against a more modern or future integrated air defense system. This paper proceeds in four sections. 1) discussion of the operational shortfalls in planning, command and control and force capabilities including a comparative analysis of Operation ALLIED FORCE and Operation DESERT STORM, 2) examination of the current and future threat, 3) recommendations for the Joint Force Commander; and 4) concluding remarks.

### **Analysis of Operation Allied Force and Operational Shortfalls**

The first and most critical shortfall that impacted the success of offensive counterair against the Serbian Integrated Air Defense System (IADS) during Operation ALLIED FORCE was the misdirected operational planning and lack of intelligence preparation of the battlespace. Operational planning and Intelligence Preparation of the Battlespace (IPB) play a vital role in offensive counterair. As noted in Joint Pub 3-01, “IPB is an analytic methodology which helps the commander understand the enemy and select an appropriate course of action...IPB aids the target development process by identifying how and where counterair operations can affect the enemy’s capabilities and operations.”<sup>8</sup> It is critical that operational planning and IPB begin well before combat operations commence in order to

determine the integrated air defense system's vulnerabilities and strengths and the enemy's intentions. "We called this one [the war against Serbia] absolutely wrong. This affected much of what followed, including the hasty activation of the joint task force, its staff, facilities, command and control, logistics, and execution, lack of a coherent campaign plan, and the race to find suitable targets", noted Admiral James O. Ellis, commander of Joint Task Force NOBLE ANVIL during Operation ALLIED FORCE.<sup>9</sup>

The insufficient planning and analysis by the Joint Force Commander was hindered by the lack of clear military strategic guidance. Although several military options were explored including a phased air campaign similar to the one conducted against Iraq, leadership at the strategic level miscalculated Serbia's resolve and believed only a couple days of strikes would be necessary.<sup>10</sup> Therefore, no coherent plan, military strategy or objectives were passed down the chain to the Joint Task Force Commander or component commander level.<sup>11</sup> Without a clear concept of operations and military objective, the analysis and intelligence preparation of the battlespace fell short. The operational analysis failed to understand the vulnerabilities and strengths of the Serbian IADS and the most likely Serbian course of action regarding the employment of its IADS.

The operational level planning and intelligence preparation of the battlespace also failed to consider utilizing non-lethal assets simultaneously with lethal assets to attack and cripple the Serbian IADS.<sup>12</sup> The one-dimensional plan relied almost exclusively on air strikes to conduct the offensive counterair attack operations and did not initially factor in Information Warfare and non-lethal fires such as computer network attack to degrade and disrupt the Serbian command, control and integrated air defense system. Secretary of Defense Cohen stated, "Successfully conducting operations to disrupt or confuse an enemy's

ability to collect, process, and disseminate information is becoming increasingly important in this “information age” of warfare. The importance of such capabilities was recognized fully during Operation ALLIED FORCE, but the conduct of an integrated information operations campaign was delayed by the lack of both advance planning and strategic guidance defining key objectives.”<sup>13</sup>

Unlike Operation ALLIED FORCE, Operation DESERT STORM against Iraq in 1991 provides a model of effective operational planning and IPB. With clear military strategic objectives, sound planning and an accurate analysis of how the Iraqi IADS functioned, the operational planners developed an integrated, synchronized concept of operations that attacked the Iraqi command, control and IADS in depth.

In Operation DESERT STORM, the first operational imperative of Commander in Chief, Central Command (CINCCENT) was to “achieve air superiority to allow Coalition freedom of movement and maneuver.”<sup>14</sup> From the CINC’s final concept of operations, the Joint Force Air Component Commander developed military objectives for air power in support of the CINC’s military objectives. The first objective was to isolate and incapacitate the Iraqi regime by targeting leadership command facilities, crucial aspects of electricity production facilities that powered military and military-related industrial systems and telecommunications and C3 [command, control and communication] systems. The second objective was to “gain and maintain air supremacy to permit unhindered air operations” by targeting strategic IADS, including radar sites, [surface- to- air missiles], and IADS control centers, and air forces and airfields.<sup>15</sup>

A critical part of the operational planning and IPB was locating and identifying the critical nodes of the IADS. As part of a joint analysis, it was determined that these nodes had

to be destroyed early in the campaign. The majority of these nodes were hit in the first strikes of the war. "The [suppression of enemy air defenses] effort to neutralize the KARI system [French built integrated air defense command and control system] proved vital to Coalition success; the initial blow, according to intelligence reports, was one from which Iraqi air defenses never recovered."<sup>16</sup>

In contrast to Operation DESERT STORM, the operational planning and analysis conducted prior to Operation ALLIED FORCE failed to accurately assess the Serbian IADS and put together an integrated and synchronized attack on the entire Serbian system. This directly impacted the concept of operations and the offensive counterair attack operations directed at destroying or neutralizing the Serbian IADS. There was no initial blow to the system combining and synchronizing all available assets as there was in DESERT STORM. Lieutenant General Marvin R. Esmond summarized the offensive counterair conducted against Serbia,

This is not to say that the US Air Force was satisfied with its suppression and destruction of enemy air defenses. It was not. NATO encountered a capable enemy who used innovative tactics. Serbian forces were still firing surface-to-air missiles on the last day of the war. The Allies were unable to knock out that capability because of the camouflage, concealment, and deception (CC&D) efforts of the Serbs. The uncertainty this presented caused us to alter our tactics. The Air Force needs to find and kill non-cooperative defensive systems much more effectively than it can today.<sup>17</sup>

In fact, the Serbians did not use innovative tactics as General Esmond stated above. Instead, Serbia adopted Iraq's IADS employment doctrine based on networking, passive targeting, mobility and survival. This doctrine used tactics that minimized the radar-based system's exposure to our radar-based high speed anti-radiation missiles (HARM), jamming and locating systems. Combined with a more capable IADS, Serbia was able to remain a threatening force throughout the war. Planners and operators at the tactical level involved in

combat missions in support of Operations NORTHERN and SOUTHERN WATCH enforcing the “no fly” zone over Iraq since DESERT STORM were not surprised in the least with Serbia’s actions.<sup>18</sup> The operational planning and analysis conducted prior to combat operations against Serbia should have predicted how Serbia would employ its IADS and developed an appropriate course of action.

Command, control and execution of Operation ALLIED FORCE was the second shortfall. According to Joint Pub 3-01,

The [Joint Force Commander] organizes forces to best accomplish the mission, assigns responsibilities, and establishes supported and supporting relationships and any necessary coordinating instructions. The [Joint Force Commander] establishes guidance and target priorities based on the concept of operations and after considering theater- and/or JOA-wide priorities along with priorities within land and naval areas of operations (AOs). The [Joint Force Commander’s] guidance and target priorities will be executed throughout the theater and/or JOA and be fully implemented by all subordinate commanders.<sup>19</sup>

Combat operations commenced against Serbia without a clear concept of operations and objective and without command responsibilities designated. Because of the miscalculation regarding the enemy’s resolve and intent at the strategic and theater strategic level, US forces were only organized for a limited war of a couple days. For the first several weeks of Operation ALLIED FORCE, staff members at the component commander level struggled with the execution of a day to day dynamic tactical battle. Staffs at all levels scrambled to fleet up, establish responsibilities and develop a coherent plan when the conflict expanded. Lieutenant General Marvin Esmond stated in reference to ALLIED FORCE, “The first [problem] was that the command and control structures, procedures, and lines of authority were complicated. The principle of unity of command must be reinforced in future training, doctrine, and operations.”

Without operational command and control in place or responsibilities clearly designated, the execution of offensive counterair was impacted. Unlike DESERT STORM where the initial strikes were devastating, only 25% of the Serbian command and control and IADS target set were attacked in the first two days.<sup>20</sup> This left the vast majority of the Serbian IADS intact. As mentioned previously, the failure to defeat the Serbian IADS at the operational level led to a dynamic tactical battle to suppress the IADS with no commander clearly in charge of the mission. Instead of conducting operational offensive counterair across the Joint Operations Area (JOA) in conjunction with non-lethal fires, support packages for strike aircraft were merely increased to provide local suppression at the tactical level.<sup>21</sup> Captain John Cryer, Commander Electronic Attack Wing, United States Navy, said of initial offensive counterair operations against the Serbian IADS,

Mission focus was on degrading the Yugoslavian (IADS), disrupting the Serbian force's communications links and killing air-defense weapon systems. An early NATO political decision not to roll back the complete IADS meant that Prowler support would have to continue at a heavy pace throughout the war...The force had to keep going back after radars that were not disabled, leading to an effort that has been described as close to what would be required for one Major Regional Contingency.<sup>22</sup>

For the first several weeks of ALLIED FORCE, the attack on the IADS remained a tactical suppression battle. This failure is due in part because the operational commander failed to clearly establish component responsibilities and define who would command and execute the dynamic evolution of targeting and destroying a mobile, flexible and networked IADS. Joint doctrine is still evolving regarding this issue and remains a topic of debate. According to one of the more recent joint publications (Joint Pub 3-01) the following responsibilities are addressed:

- 1) In order to attain a desired degree of air superiority...the (JFCs) integrate the capabilities of each component to conduct offensive and defensive [counterair] operations.

- 2) The JFC normally designates the Joint Force Air Component Commander (JFACC) as the supported commander for theater-and/or joint operations area (JOA)-wide counterair.
- 3) The JFC may apportion component capabilities to the JFACC... for counterair operations.<sup>23</sup>

Although never clearly defined during ALLIED FORCE, the command and control of offensive counterair and time sensitive target prosecution fell to the Joint Force Air Component Commander (JFACC) and his staff. This occurred largely because the JFACC supporting staff and operations center was the only organization capable of handling this function. The JFACC was already responsible for all air deconfliction and the Air Tasking Order. Planners and liaison elements from all components including an Information Operations cell were on hand making the joint force air component the most proficient organization. The JFACC and the Combined Air Operations Center in Vicenza, Italy became the adhoc operations center for attacking all time-sensitive targets, deconflicting airborne strike assets and managing the limited information warfare effort. Having failed with an initial blow to neutralize the Serbian IADS, the rest of the conflict was spent searching for pieces of the system in order to destroy them.

Throughout the conflict, all lethal fires and non-lethal fires were never integrated and synchronized under one command and one operations center.<sup>24 25</sup> No cohesive planning to integrate non-lethal fires was accomplished at the operational level until after the conflict had commenced. The only apparent form of information warfare used from the onset was airborne jamming.<sup>26</sup> “Only later did U.S. computer hackers penetrate air defense computers with enough success to insert false messages and targets to protect attacking NATO aircraft.”<sup>27</sup>

The third shortfall of ALLIED FORCE was U.S. force capability limitations that inhibited offensive counterair operations. Deficiencies in command, control, communication and computer systems, intelligence, surveillance and reconnaissance (C4ISR) and weapons to engage a passive IADS were highlighted. Although this is not a force structure paper, the author will briefly discuss the deficiencies.

U.S. and NATO forces had a difficult time locating and targeting the mobile and passive IADS components and command and control nodes. Many assets were not link capable and could not receive targeting data when it was available. The disparity in situational awareness and common battlespace picture across the joint force caused long delays in the deconfliction, tasking and target prosecution process of time sensitive targets. General Esmond summarized the deficiencies in allied C4ISR capabilities when he stated,

As a subset of both air superiority and information superiority, many of the air campaign participants saw the need of new measurement and signature techniques that could accurately locate IADS elements whose radars are not transmitting or are hiding. Many of our current electronic combat systems are geared to technologies that are rapidly being replaced in the marketplace by state-of the-art technology...The critical need for effective battlespace awareness was most apparent as NATO [during ALLIED FORCE] tried to locate and destroy the hidden IADS...Once located and validated, the C4I system must be able to support battlespace awareness and speed necessary in the sensor-to-shooter cycle.<sup>28</sup>

In addition to the difficulties in locating the passive systems, we had trouble destroying the passive systems. U.S. systems are designed to attack radar-based IADS. For example, the high speed anti radiation missile (HARM), our primary SEAD weapon, guides on radar energy. If the radar shuts down it is ineffective. The Serbians were very effective at blinking their radars to remain less vulnerable to the HARM. It is critical to offensive counterair to maintain pressure on the entire air defense system across the JOA and destroy

components when given the opportunity. The effects of destroying components vice suppressing is “cumulative and increases aircraft survival”.<sup>29</sup>

The operational shortfalls in planning, command, control, execution and force capabilities impacted our ability to conduct offensive against a less than modern integrated air defense system. After a 78-day operation, the Serbian IADS continued to function suggesting we are not prepared to neutralize a state-of the-art IADS without paying a high cost in lives and assets. The following section will examine the future threat.

### **The Future Threat**

If an airforce of 1,000 aircraft flying two sorties per day per aircraft suffered a one percent attrition rata rate, that air force would fly 45,150 sorties and have only 557 aircraft remaining at the end of 30 days of combat. If the attrition rate jumped to 10 percent, that same air force would fly only 8,320 sorties and have but two aircraft remaining at the end of 30 days!<sup>30</sup>

As described above, an effective IADS does not have to destroy a large percentage of aircraft to neutralize or disrupt an air force. Also, the example does not factor in aborted strikes and jettisoned ordnance while avoiding surface-to-air missiles and anti-aircraft artillery.

Neutralizing the Serbian IADS took a disproportional number of SEAD assets to counter a good but outdated threat. Secretary of Defense Cohen stated, “While we prevailed in delivering a punishing air offensive with virtually no loss to NATO forces, we must acknowledge some concerns for the future. Although among the most capable that the United States has faced in combat, the FRY air defense systems did not represent the state-of-the-art systems, and we need to prepare for that possibility now.”<sup>31</sup> NATO forces had difficulty defeating components of the IADS such as the 25 year old SA-6 (surface-to-air missile).

New, more lethal systems like the SA-10 and SA-12 are both proliferating rapidly and will be employed in over 22 countries by 2005.<sup>32</sup>

The state-of the art IADS will have enhanced networking giving it even greater flexibility and redundancy. An example of the new technology available is the low-level air defense system (LLADS). “In the wake of the Kosovo conflict, European industry in particular foresees a booming market for highly integrated, networked low-level air defense systems (LLADSs) solutions featuring a variety of new sensor, fire control, battle management and weapons technologies.”<sup>33</sup> This type system (currently in production), networked into a larger IADS, will feature “an integrated fire unit concept with new battle management command and control capabilities”, a mobile, unmanned radar sensor “complemented by a electro-optic system featuring infra red (IR), TV and laser sensors.” The radar “provides a high quality 3-D air picture and superior detection performance against stealth targets.”<sup>34</sup>

The most important upgrade to the IADS of the near future is the use of modern digital command link technologies which will establish a flexible, redundant and fully networked system capable of passively engaging multiple targets without exposing key nodes during engagement sequences. The system will appear mobile because various linked active targeting systems such as a fire control radar will blink (switch on then off) to build a targeting quality level picture. This picture will be available throughout the network for other systems to engage passively or update data. No single component will remain operating long enough to target. The Serbs used this technique effectively with their western radars.

These networks, including the command and control, will be extremely difficult to target and destroy. “Well designed and operated networks tend to be models of flexibility and adaptability...Alternate routings, self-repairs, and rapid reconstruction tend to be

characteristic of good networks.”<sup>35</sup> The attack on the system must be in depth. It must be cohesive, integrated, and simultaneous across the full spectrum of the system. Information Operations (IO) including computer network attack, electronic attack (EA) and perception management should be synchronized across the JOA with precision strikes. It will be necessary to not only destroy key nodes and system components but to attack the entire system simultaneously to bring it down.<sup>36</sup>

### **Recommendations and Counter Arguments**

The critical analysis of Operation ALLIED FORCE discussed operational shortfalls in planning, command, control and force capabilities which impacted our ability to conduct offensive counterair and seize air dominance. Against a state-of-the-art IADS, these shortfalls will be magnified at the cost of U.S. lives. This section will make recommendations for the joint force commander to ensure offensive counterair is conducted with efficiency and synergy across the entire JOA:

- 1) In order to improve planning and intelligence preparation of the battlespace for offensive counterair, the JFC should maintain a standing offensive counterair cell under the joint targeting coordination board. The cell would be responsible for ensuring a continuous process of focused intelligence preparation of the battlespace, analysis and wargaming against modern IADS capabilities. In accordance with joint doctrine, offensive counterair target priorities should be identified through the joint targeting process. The counterair cell would coordinate and integrate lethal and non-lethal capabilities and make recommendations through the joint targeting coordination board and the J-3 to the JFC. This cell should work in conjunction with a joint fires element (JFE) to ensure maximum “coordination and integration for effective unity of effort.”<sup>37</sup>

2) It is imperative the JFC establish a single commander to fight the JOA-wide OCA battle. The JFC should apportion IW and component capabilities to one commander who integrates and synchronizes lethal and non-lethal fires in order to mass the effects of the attack. Under one commander, the dynamic execution of OCA would be orchestrated by one operations center to attack in depth. "Simultaneity and depth refers to the operational art of bringing force to bear on the opponent's entire structure [integrated air defense system] in a near simultaneous manner to overwhelm and cripple enemy capabilities and the enemy's will to resist."<sup>38</sup>

If the JFC establishes a JFACC, the command and control of the offensive counterair battle along with the joint fires element should be designated to the JFACC. The JFACC staff is manned by liaison representatives and planners from all specialties and component commands, maintains a 24 hour operations center and conducts battlespace deconfliction for the JFC. This unifies the effort but does not strip the other component commanders of their ability to command and control J-SEAD at the tactical level in their respective AO. The counterair cell at the JFC level would continue to translate the JFC's target priorities and guidance to the JFACC counterair cell.

3) Although it is not the responsibility of the JFC to train forces and develop capabilities, as a warfighter, the JFC certainly has input in the force capabilities required to conduct the offensive counterair mission. Force providers should ensure forces have trained to the potential threat of a modern IADS and conducted joint operations directed at this complex problem. To further develop joint doctrine and implement it, leaders must fully support joint training such as the upcoming GREEN FLAG (Spring, 2000), Nellis AFB,

Nevada. This exercise will pursue an OSD mandate to “evaluate cross-service SEAD performance at the campaign level.”<sup>39</sup>

As with the joint force fires coordinator and joint fires element, many argue that standing up and maintaining a counterair cell at the operational level is redundant, unnecessary and results in the micromanaging of the targeting process. Component commanders also resist losing control of their asset in fear of asset misuse or of not being available when needed in the commander’s AO. The result of these bodies given too much responsibility is centralized execution. However, as demonstrated during Operation ALLIED FORCE, it is critical that IPB and analysis be a continuous process and essential for the JFC to formulate clear objectives and a coherent concept of operations. Without solid guidance and a sound operational plan, tactical level victories may not result in a successful operation. In order for the JFC to provide this cohesive plan and assess priorities, the JFC must have a proficient staff with a full understanding of the operation and enemy.

This author is not recommending the JFC maintain an operations center to execute the battle and prosecute time-sensitive targets. The JFC should focus on providing guidance to impact operations 72 hours and out. The task of maintaining a warfighting operations center should be delegated to the JFACC because of the existing operations center, staff composition, and the responsibility to provide battlespace deconfliction across the JOA. Although executing this function at the JFC level ensures the execution is in line with the JFCs priorities, it is more important to have a single commander responsible for integrating and deconflicting all fires to accomplish a full spectrum attack on the IADS.

## **Conclusion**

The argument can be made Operation ALLIED FORCE was a further proof of our ability to dominate the skies. "From the outset, one of the primary target sets was the Serbian integrated air defense system. The fact that it claimed just two NATO aircraft, analysts say, is testament to the efficiency of NATO's defense suppression campaign."<sup>40</sup>

This view is nearsighted and does not look closely at the shortfalls and potential impact should we face a modern IADS. ALLIED FORCE provided us with a snapshot of our potential limitations in defeating a state-of-the-art IADS. The fact the operation required SEAD assets equivalent to those required in a major theater war should raise doubts on our abilities. In their joint statement, Secretary of Defense Cohen and General Shelton, CJCS, discussed this:

NATO's air defense suppression forces were committed heavily to this campaign. U.S. systems such as RC-135 Rivet Joint electronic intelligence aircraft and EA-6B tactical airborne electronic warfare aircraft were employed in numbers roughly equivalent to those anticipated for a major theater war, and even then were heavily tasked. We need to find innovative and affordable ways to exploit our technological skills in electronic combat to bring greater pressure to bear on a future enemy's air defense system.<sup>41</sup>

The future threat will be networked, redundant and flexible. Detailed planning and intelligence preparation of the battlespace should occur on a continuous basis at the operational level to analyze and assess the enemy's intent and capabilities. Seizing air dominance will remain a priority for the JFC because it impacts all phases of the operation. As a priority, it deserves constant, focused attention at the operational level. An initial blow to the enemy's system massing the effects of lethal and non-lethal fires followed by a continuous attack in depth to sustain pressure on the entire system is critical.<sup>42</sup> The modern IADS will be more mobile and redundant requiring robust C4ISR capabilities to facilitate the dynamic targeting process. A single commander should command and control offensive

counterair and be allocated the forces and capabilities to ensure the attack is cohesive and the effects are maximized. To attack time-sensitive targets, one warfighting battlestaff and operations center should have the responsibility to rapidly validate targets and task tactical commanders or shooters to attack while sustaining pressure on the IADS through non-lethal and planned lethal fires

Defeating an IADS of the future through attack in depth to achieve air dominance and allow our forces freedom to move throughout the battlespace will remain a complex problem. Operation ALLIED FORCE demonstrated shortfalls in our ability to plan, command, control and execute offensive counterair. The JFC should empower a cell to focus planning on the integration of lethal and non-lethal fires on the entire structure of the IADS and designate a single commander to fight the offensive counterair battle to achieve air dominance. Combined with increased C4ISR and strike warfare capabilities, the JFC will accomplish future missions with fewer American lives lost.

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## Endnotes

<sup>1</sup> Joint Chiefs of Staff, Joint Doctrine for Countering Air and Missile Threats, (Joint Pub 3-01) (Washington D.C.: February 1, 2000), vii.

<sup>2</sup> There are various degrees of air dominance. According to Air Force Doctrine, "Superiority is that degree of dominance that permits friendly land, sea, and air forces to operate at a given time and place without prohibitive interference by the opposing force. Supremacy is that degree of superiority wherein opposing air and space forces are incapable of effective interference anywhere in a given theater of operations." U.S. Air Force, Air Force Basic Doctrine Document 1 (Maxwell Air Force Base, Alabama: September 1997), 29.

<sup>3</sup> General Ronald R. Fogelman, Chief of Staff, United States Air Force, "Strategic Vision and Core Competencies" (as delivered at the Air Force Association Symposium, Los Angeles, CA, 18 Oct 96. <<http://www.au.af.mil/au/awc/csafafa.htm>> (2 February 2000), 3.

<sup>4</sup> Air Force Basic Doctrine Document 1, 29

<sup>5</sup> Richard P. Hallion and Michael Irsh, "Air and Space Superiority", Air and Space Power in the New Millennium, (Significant Issues Series, Volume XIX, number 4) (Washington D.C.: CSIS 1997), 93.

<sup>6</sup> "[Joint Force Commanders] integrate the capabilities of each component to conduct OCA... Oca operations seek to dominate the enemy's airspace and prevent the launch of threats...OCA consists of offensive measures to destroy, disrupt or neutralize enemy aircraft, missiles, launch platforms and their supporting structures and systems. Ideally, most joint OCA operations will prevent the launch of aircraft and missiles by destroying them and their supporting infrastructure prior to launch. OCA includes attack operations, fighter sweep and escort missions, suppression of enemy air defenses, and electronic warfare."

Joint Chiefs of Staff, Joint Doctrine for Countering Air and Missile Threats, (Joint Pub 3-01) (Washington D.C.: 19 October 1999), v-vi.

<sup>7</sup> "Cohen, Shelton: Joint Statement on the Kosovo After Action Review." U.S. Department of Defense, 14 October 1999. <<http://www.defense-aerospace.com/data/verbatim/data/ve49/>>(16 December 1999).

<sup>8</sup> Joint Chiefs of Staff, Joint Doctrine for Countering Air and Missile Threats, (Joint Pub 3-01) (Washington D.C.: 19 October 1999), II-8.

<sup>9</sup> Edgar L. Prina, "Air War Kosovo: Lessons Learned and Relearned". Sea Power, November 1999.

<sup>10</sup> "Cohen, Shelton: Joint Statement on the Kosovo after Action Review."

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<sup>11</sup> Lt Col Donald I. Blackwelder, USAF, J-35 Joint Task Force Noble Anvil and U.S. Team Chief, CAOC, Vicenza, Italy, interview by author, 26 January 2000, Naval War College, Newport, RI.

<sup>12</sup> Lethal fires include: strike aircraft, attack rotary wing, CALCM, TLAM, Army ATACM and MLRS. Non-lethal fires include communication and radar jamming, computer network attack, perception management.

<sup>13</sup> "Cohen, Shelton: Joint Statement on the Kosovo After Action Review."

<sup>14</sup> "Extracts from: Conduct of the Persian Gulf War", Naval War College. Reprinted from Conduct of the Persian Gulf War, Final Report to Congress, April 1992, 90.

<sup>15</sup> Ibid., 125.

<sup>16</sup> Ibid., 124.

<sup>17</sup> "Statement of: Lieutenant General Marvin R. Esmond, Deputy Chief of Staff Air and Space Operations, United States Air Force"  
<<http://www.house.gov/hasc/testimony/106thcongress/99-1-19esmond.htm>>(16 December 1999), 1.

<sup>18</sup> LCDR Michael Herrera, USN, VAQ-142, Tactics Officer, telephone conversation with author, 1 February 2000.

<sup>19</sup> Joint Pub 3-01, II-8.

<sup>20</sup> Lt Col Blackwelder, interview by author.

<sup>21</sup> "SEAD operations destroy, neutralize, or temporarily degrade enemy surface-based air defenses in a specific area by destructive or disruptive means... SEAD resources may include specialized aircraft, multirole aircraft, helicopters, air-to-surface missiles, artillery, SOF, and UAVs... SEAD operations fall into three categories: AOR and/or JOA air defense system suppression, localized suppression, and opportune suppression. AOR and/or JOA air defense system suppression contributes to air superiority by disabling enemy air defense systems or major capabilities of those systems. Localized suppression operations normally have specified time and space limitations because they support specific operations or missions. Opportune suppression includes self-defense and offensive attacks against enemy air defense targets of opportunity." Joint Pub 3-01, IV- 4.

<sup>22</sup> Kieran Chaison, "Prowler Commander Briefs Crows", Washington Report,  
<<http://www.jedlonline.com/jed/html/new/dec99/wash.html>>(20 December 1999).

<sup>23</sup> Joint Pub 3-01, v, vii,viii.

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<sup>24</sup> John A. Tirpak, "Short's View of the Air Campaign", Washington Report, September 1999, 4.

<sup>25</sup> Elaine Grossman M. "Army Commander In Albania Resists Joint Control Over Apache Missions", Inside the Pentagon, May 20, 1999.

<sup>26</sup> Bradley Graham, "Military grappling with Rules for Cyber Warfare" The Washington Post, 8 November 1999, A1.

<sup>27</sup> David Fulghum, "Telecom Links Provide Cyber-Attack Route", Aviation Week and Space Technology, <<http://www.awgnet.com/aviation/aw/81.htm>> (1 February 1999), 1.

<sup>28</sup> "Statement of: Lieutenant General Marvin R. Esmond, Deputy Chief of Staff Air and Space Operations, United States Air Force", 6.

<sup>29</sup> Joint Chiefs of Staff, JTTP for Joint Suppression of Enemy Defenses, (Joint Pub 3-01.4) (Washington D.C.: 25 July 1995), I-6.

<sup>30</sup> Joint Pub 3-01.4, I-2.

<sup>31</sup> "Cohen, Shelton: Joint Statement on the Kosovo After Action Review."

<sup>32</sup> Richard P. Hallion and Michael Irsh, "Air and Space Superiority", 100.

<sup>33</sup> "Protecting High Value Assets Against Threat from the Skies", Janes International Defense Review; 1 November 1999, <<http://idr.janes.com/features.html>> (7 January 2000), 3.

<sup>34</sup> Ibid.

<sup>35</sup> Vice Admiral Arthur K. Cebrowski, USN, President, Naval War College, "Network Centric Warfare: An Emerging Military Response to the Information Age", Naval War College, (Presentation at the 1999 Command and Control Research and Technology Symposium) 29 June 1999, 5.

<sup>36</sup> Mark Herman, "Entropy-Based Warfare", JFQ, Autumn/Winter 1998-99, 89.

<sup>37</sup> Joint Chiefs of Staff, Doctrine for Joint Targeting, (Joint Pub 3-60, second draft) (Washington D.C.:15 April, 1999), I-7.

<sup>38</sup> Joint Pub 3-60, I-15.

<sup>39</sup> Zachary Lum, "The Game of SEAD", <<http://www.jedonline.com/jed/html/new/may99/cover.html>> (12-20-99).

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<sup>40</sup> Nick Cook, “Kosovo: War of Extremes”, Jane’s Defence Weekly, <[www.janes.com/defence/features/kosovo/extremes.html](http://www.janes.com/defence/features/kosovo/extremes.html)>(30 November 1999), 6.

<sup>41</sup> “Cohen, Shelton: Joint Statement on the Kosovo After Action Review.”

<sup>42</sup> Joint Pub 3-0, A-1.

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